Technology of the SCAPS

Investigative Sensors and Tools

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Technology of the SCAPS

- ***S**ite*
- ***C**haracterization and*
- ***A**nalysis*
- ***P**enetrometer*
- ***S**ystem*

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Talking Points

- SCAPS Overview
- Technology and Tools
- Production and Cost Savings
- Conclusion

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SCAPS Overview

- SCAPS Funded by Army Environmental Center (AEC)
- Tri-Service Effort
  - Air Force Developed Tunable Laser System (ROST)
  - Army Developed Laser Induced Fluorescence Probe and Delivery System
  - Navy Developed Nitrogen Laser System
- Six Government Owned Trucks

SCAPS Overview

- Speed Site Characterization of Military Installations
- Monitor Implemented Remedial Actions
- Decrease Cost

SCAPS Overview

Technology and Tools

- Laser Induced Fluorescence (LIF) Probe with Stratigraphy Sensor - Developed by Army
- Power Punch ™ - Developed by Geo Insight ™
- HydroSparge and Direct Sample Ion Trap Mass Spectrometer (DSITMS) - Developed by Oak Ridge National Laboratory
- Membrane Interface Probe to Detect Chlorinated Compounds - Developed by Geoprobe Systems ™
- Video Probe - Commercially Available from ARA

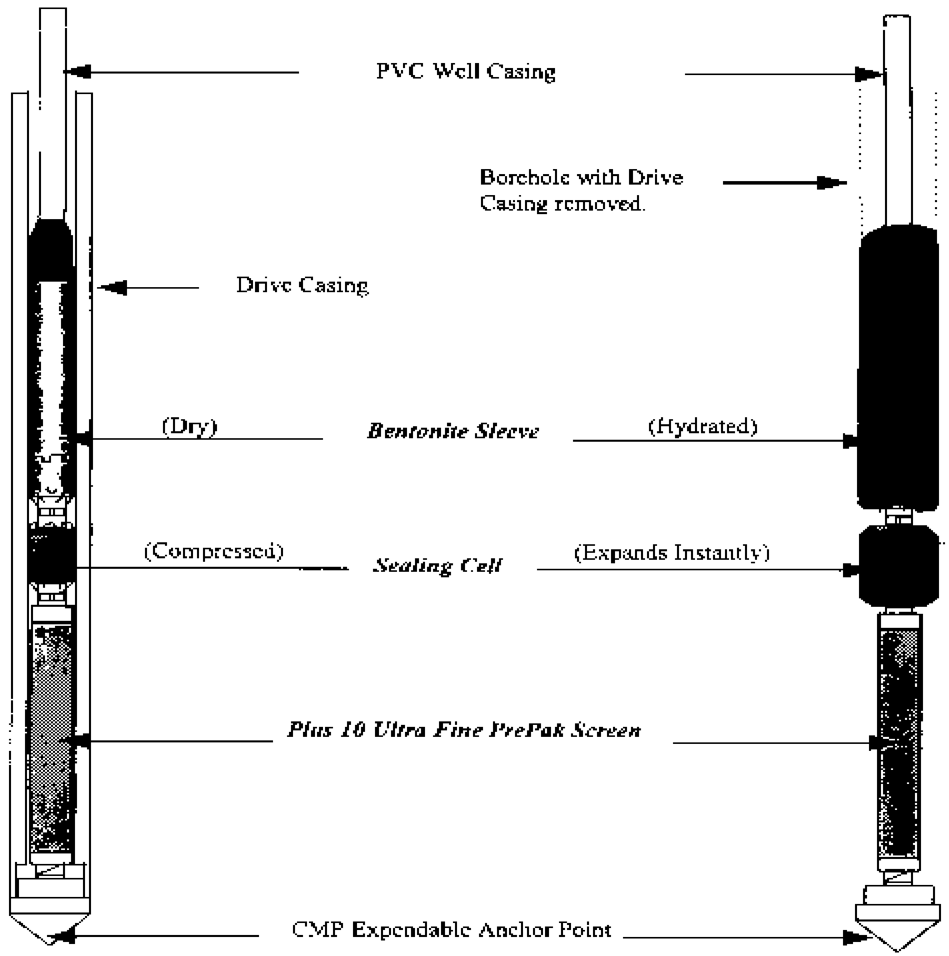
Laser Induced Fluorescence (LIF)

- Employs ROST Laser or Nitrogen Laser Systems
- Defines Horizontal and Vertical extent of POL's
- Defines Subsurface Stratigraphy
- Readings are Taken Every 4 Inches Vertically
- Newer Laser Systems Define POL Type with Post Processing
- Laser Systems are Commercially Available

Power Punch

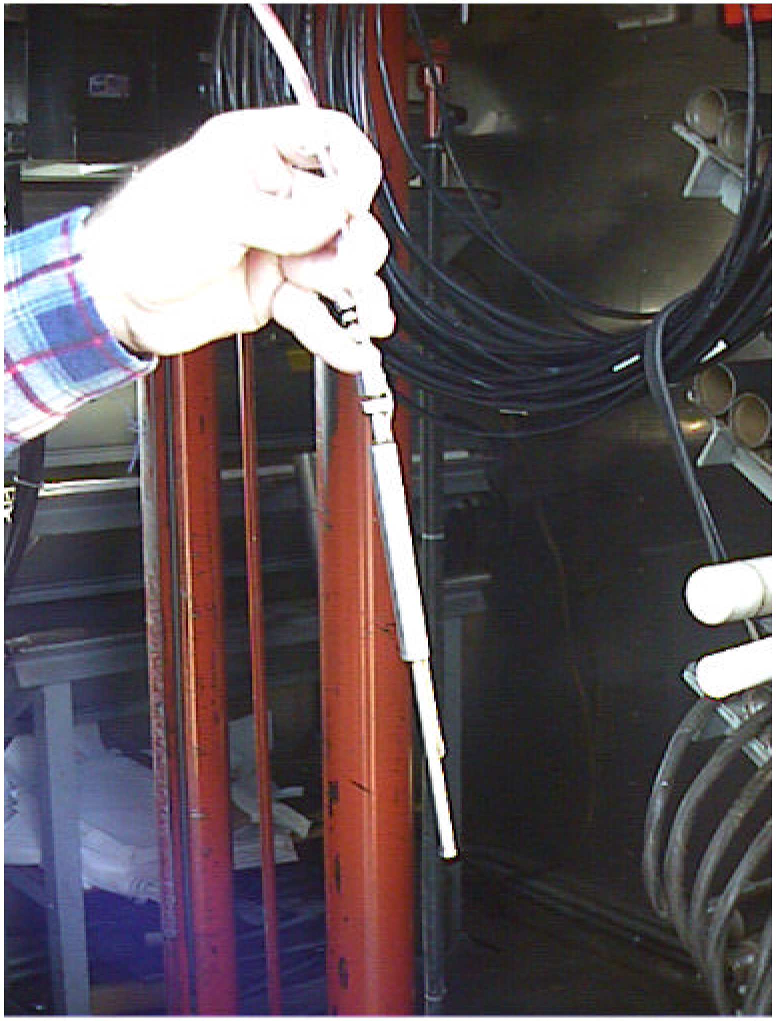
Push Configuration

Installed Configuration



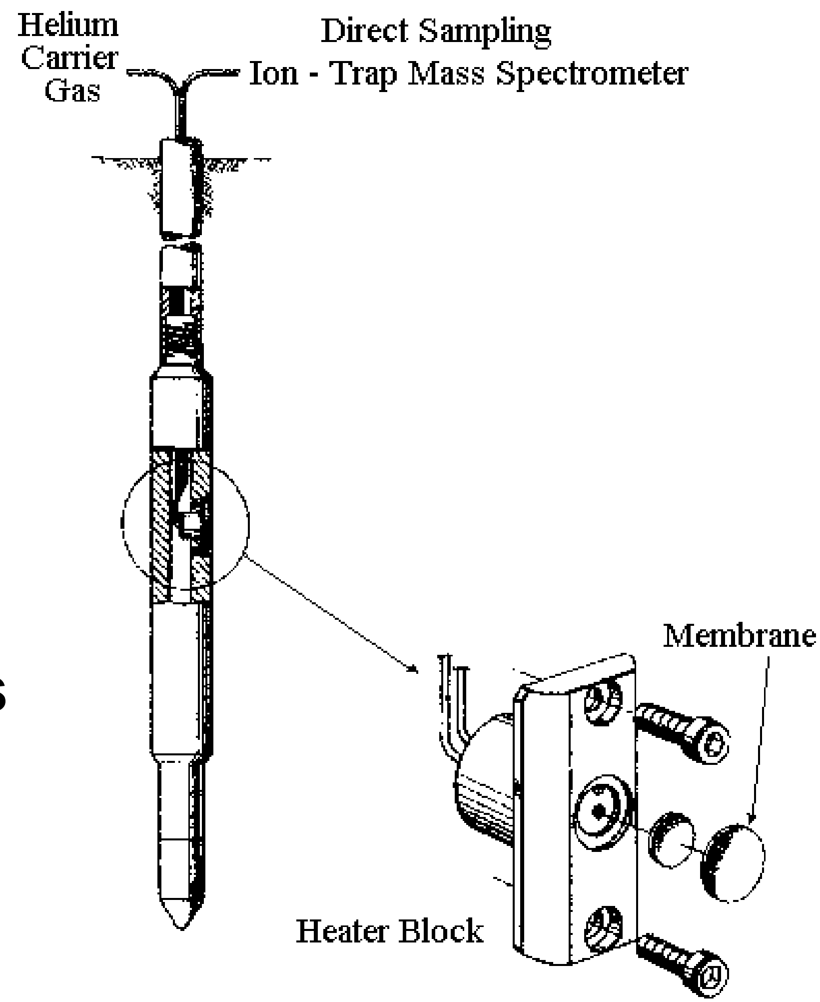
HydroSparge

- Collects and Detects Volatile Organic Compounds in Groundwater
- Employs a Direct Sample Ion Trap Mass Spectrometer (DSITMS) for Analysis
- Contamination Identification and Quantification
- DSITMS Field Method - 8265 Accepted by EPA



Membrane Interface Probe (MIP)

- Defines Volatile Organic Compounds - Not Medium Specific as HydroSparge
- Multiple Samples may be Collected with Depth
- Sample Intervals are User Defined
- SCAPS Currently Uses a DSITMS for Onboard Analysis Other Detectors may be Used
- SCAPS MIP also Defines Subsurface Stratigraphy



MIP Advantages

- In Field identification of contaminant distribution
- Field quantification possible between 300 ppb and 100,000 ppb using ion trap mass spectrometer
- Field identification of volatile organic compounds when using ion trap mass spectrometer
- SCAPS MIP has grout through the tip capability
- Enormous amount of data can be generated in short time period
- Sample interval can be selected as long as minimum separation > 1 foot

MIP Disadvantages

- Enormous amount of data can be generated
- Sampling requires a pause in push advance, MIP takes longer than other types of direct pushes
- Mass spectrometer cannot distinguish isomers of same compound
- Heater block and selective membrane are individually produced, replacement may change system operating parameters (heating rate differs or to higher temperature, different sensitivity to lower contaminant concentrations)

Video Probe

- Real Time Video of Subsurface
- Grain Size Analysis
- Thin Stratigraphic Layer Delineation

Production

- SCAPS has been to 37 Air Force Bases
- Production Example of In-Situ Sensors
- Production Example of Chemical Sensors

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Production of In-Situ Sensors

	First Trip 5 Days			Second Trip 7 Days		
	Total Footage	Total Pushes	Average	Total Footage	Total Pushes	Average
LIF	1,386	30	46	2,052	44	47
Soil Sample	307	11	28	335	12	28
PrePush	170	34	5	8	2	4
Sample Point	-	-	-	1,171	36	33
Totals	1,863	75	25	3,566	94	38

Days do not include Mob/Demob time

Production of Chemical Sensors

Total Pushes	54
Total Days	24
Number of Samples Analyzed	702
Average Depth	50
Total Depth	2,677

Cost Savings Example

Courtesy Tulsa District

Conclusion

Questions?

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Thank You